

Customer No.: 31561  
Docket No.: 13869-US-PA  
Application No.: 10/711,838

### **REMARKS**

#### **Present Status of the Application**

The Office Action rejected all presently-pending claims 1-15. Specifically, the Office Action rejected claims 1-2, 4-6 under 35 U.S.C. 102(b), as being anticipated by Chen et al. (U.S. 6,692,903). The Office Action also rejected claims 8-10, 12-14 under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Mui (U.S. 2003/0228532). The Office Action rejected claims 3 and 11 under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Wolf et al. (Silicon Processing for the VLSI Era, Vol. 1, Lattice Press (1986)). The Office Action rejected claims 7 and 15 under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Wolf et al. (Silicon Processing for the VLSI Era, Vol. 4, Lattice Press (2002)).

Applicant has amended claims 1 and 9 to more clearly define the present invention. Applicant has also amended claims 9-15 to correct typographic errors. After entry of the foregoing amendments, claims 1-15 remain pending in the present application, and reconsideration of those claims is respectfully requested.

#### **Discussion of Office Action Rejections**

*Applicant respectfully traverses the 102(b) rejection of claims 1-2, 4-6 because Chen et al. (U.S. 6,692,903) do not teach every element recited in these claims.*

In order to properly anticipate Applicants' claimed invention under 35 U.S.C 102, each and every element of claim in issue must be found, "either expressly or inherently described, in a

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single prior art reference". "The identical invention must be shown in as complete details as is contained in the .... claim. Richardson v. Suzuki Motor Co., 868 F. 2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)." See M.P.E.P. 2131, 8<sup>th</sup> ed., 2001.

The present invention is in general related an etching process as claim 1 recites:

Claim 1. An etching process, comprising:  
providing a material layer having a bottom anti-reflection coating (BARC) and a patterned photoresist layer thereon;  
etching the BARC using the patterned photoresist layer as a mask, wherein polymer as an etching by-product is formed on the patterned photoresist layer;  
etching the BARC performing a cleaning step to remove the polymer from the patterned photoresist layer; and  
etching the material layer using the patterned photoresist layer as a mask, *wherein the cleaning step is performed before the step of etching the material layer.*

Chen fails to teach or suggest that the cleaning step is performed before the step of etching the material layer. Chen teaches the anti-reflective material 50 is etched, and the electrically conductive material 45 may then be etched. Thereafter, the diffusion barrier layer 40 may be etched. After completion of the etching processes, the substrate 30 is transported out of the etching chamber and into the transfer chamber 125. Then, the substrate 30 may be transferred from the transfer chamber 125 into a cleaning chamber 120 to remove the etchant residue 70 and remnant resist 60 (col. 6, lines 19-54). In other words, the cleaning step is performed after the electrically conductive material 45 is etched. Chen does not teach or suggest that a cleaning step is performed after the anti-reflective material 50 is etched or before the electrically conductive material 45 is etched.

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In claim 1 of the present application, the cleaning step is performed before the material layer is etched. Because the cleaning step is performed before the material layer is etched, the polymer generated in the etching step of the BARC can be removed in the cleaning step, such that the patterns of the photoresist layer can be accurately transferred to the material layer in the etching process of the material layer.

For at least the foregoing reasons, Applicant respectfully submits that independent claim 1 patently defines over the prior art reference, and should be allowed. For at least the same reasons, dependent claims 2, 4-6 patently define over the prior art as well.

*Applicant respectfully traverses the rejection of claims 8-10, 12-14 under 103(a) as being unpatentable over Chen in view of Mui (U.S. 2003/0228532), the rejection of claims 3 and 11 under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Wolf et al. (Silicon Processing for the VLSI Era, Vol. 1, Lattice Press (1986))(Wolf I) and the rejection of claims 7 and 15 as being unpatentable over Chen in view of Wolf, (Silicon Processing for the VLSI Era, Vol. 4, Lattice Press (2002))(Wolf IV) because a prima facie case of obviousness has not been established by the Office Action.*

To establish a prima facie case of obviousness under 35 U.S.C. 103(a), each of three requirements must be met. First, the reference or references, taken alone or combined, must teach or suggest each and every element in the claims. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of

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ordinary skilled in the art, to combine the references in a manner resulting in the claimed invention. Third, a reasonable expectation of success must exist. Moreover, each of the three requirements must "be found in the prior art, and not be based on applicant's disclosure." See M.P.E.P. 2143, 8<sup>th</sup> ed., February 2003.

Applicant submits that, as disclosed above, Chen fails to teach or suggest each and every element of claim 1, from which claims 3 and 7-8 depend. Mui, Wolf I and Wolf IV also fail to teach that the cleaning step is performed before the step of etching the material layer. Mui, Wolf I and Wolf IV cannot cure the deficiencies of Chen. Therefore, independent claim 1 is patentable over Chen, Mui, Wolf I and Wolf IV. For at the least the same reasons, its dependent claims 3 and 7-8 are also patentable as a matter of law.

In addition, the present invention is also related a patterning process as claim 9 recites:

Claim 9. A patterning process, comprising:  
sequentially forming a bottom anti-reflection coating (BARC) and a photoresist layer on a material layer;  
performing a lithography process to pattern the photoresist layer;  
trimming the patterned photoresist layer;  
etching the BARC using the patterned photoresist layer as a mask, wherein polymer as an etching by-product is formed on the patterned photoresist layer;  
performing a cleaning step to remove the polymer from the patterned photoresist layer;  
and  
etching the material layer using the patterned photoresist layer as a mask, *wherein the cleaning step is performed before the step of etching the material layer*,  
wherein the step of etching the BARC, the cleaning step and the step of etching the material layer are performed in-situ.

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As discussed above, Chen fails to teach or suggest that the cleaning step is performed before the step of etching the material layer. Mui also fails to teach that the cleaning step is performed before the step of etching the material layer. Therefore, the references combined do not teach or suggest each and every element in claim 9, and thus independent claim 9 is patentable over Chen and Mui, and should be allowed. In addition, Mui, Wolf I and Wolf IV cannot cure the deficiencies of Chen. Therefore, independent claim 9 is patentable over Chen, Mui, Wolf I and Wolf IV. For at the least the same reasons, its dependent claims 10-15 are also patentable as a matter of law.

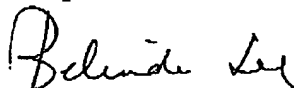
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### CONCLUSION

For at least the foregoing reasons, it is believed that the pending claims are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

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Respectfully submitted,

  
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